TROPICAL DISEASES BUREAU.

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DISEASES DUE TO PROTOZOAN PARASITES.

SCHOENING (Harry W.) & FORMAD (Robert J.). **A Study of the Serology, the Cerebrospinal Fluid, and the Pathological Changes in the Spinal Cord in Dourine.**—*Jl. Agric. Research.* 1923. Dec. 8. Vol. 26. No. 10. pp. 497–505.

The animal from which the material for study was obtained was a fifteen-year-old stallion, which had been condemned as dourine-infected on the grounds of a positive conplement-fixation test in 1913. From 1913 to 1919 he showed no evidence of infection and was worked. During 1920 and 1921 the animal did no work, and gradually lost flesh. During the latter year symptoms indicating involvement of the central nervous system were observed. He would turn in a circle in one direction for several minutes, sometimes falling to the ground and after several minutes would rise again apparently normal. The horse died in December, 1921.

Post-mortem findings :—Gelatinous infiltration of the subcutaneous tissue and abdominal muscles. The left testicle was half the normal size, soft and flabby, and firmly adherent to the coverings. The spleen was slightly thickened and showed haemorrhagic infarctions. The dorsal and lumbar portions of the spinal cord showed gelatinous infiltration.

During the animal's life it was tested eleven times by the conplement-fixation test, and gave fairly constant rather weakly positive results.

Cerebrospinal fluid obtained after death was subjected to the colloidal gold globulin and complement-fixation tests. A cell count was also carried out. A positive result was obtained with each of the biological tests, and it is interesting to note that the reaction with the complement-fixation test was more pronounced with the cerebrospinal fluid than with the blood serum taken at the same time.

An average of three cell counts showed 180 per c.mm. Since in normal cerebrospinal fluids this count ranges from 0 to 10 the finding is significant.

It is to be noted that the only controls available for these tests were obtained from three calves killed experimentally with blackleg.

Histological examinations of the spinal cord only were undertaken, and the sections were cut from the dorsal and lumbar portions of the cord. The lesions found were mainly in the latter portion, and were

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as follows :—The capillaries of the dura and pia mater were congested. There was an increase in neuroglia cells which was more marked in the lateral and dorsal columns than in the ventral columns.

Slight evidence of commencing degeneration of the myelin in the medullated fibres was obtained with GOLGI'S method. HELLER'S method rendered the changes more apparent, and it was seen to be more pronounced in the dorsal than in the lateral columns.

VELU, BAROTTE, BALOZET, & BIGOT. **Les réactions à la trypanoléine de Van Saceghem dans les trypanosomiases animales au Maroc.** [Trypanolein (Van Saceghem) in Animal Trypanosomiases in Morocco.]—*C. R. Soc. Biol.* 1924. Jan. 18. Vol. 90. No. 1. pp. 12–13.

The authors have tested the diagnostic value of a material prepared exactly according to the method described by VAN SACEGHEM for the production of trypanolein. They have arrived at the opinion that it does not permit of the diagnosis of trypanosomiasis.

SPACKMAN (W. C.). **The Serum-Aldehyde Test applied to Trypanosomiasis : Observations on Camels.**—*Brit. Med. Jl.* 1923. Dec. 29. p. 1257.

The author records the results of the serum aldehyde test carried out with the sera of 6 camels infected with or suspected of Surra. Trypanosomes were found in the blood of four while the blood of the other two was negative. In 5 of the 6 cases the addition of one drop of formalin to 1 cc. of serum caused opalescence and gelatinization. In the remaining case the serum became faintly opalescent and slightly viscous.

The sera of two healthy camels were used as controls. Both of these remained clear and liquid.

v. FENYVESSY (B.) & REINER (L.). **Untersuchungen über den respiratorischen Stoffwechsel der Trypanosomen.** [The Respiratory Metabolism of Trypanosomes.]—*Zeitsch. f. Hyg. u. Infektionskrankh.* 1924. Apr. 7. Vol. 102. No. 1–2. pp. 109–119.

Living trypanosomes are capable of abstracting oxygen not only from whole blood but from plasma that contains no corpuscles and of giving out carbon dioxide. By means of the BARCROFT-HALDANE apparatus the gaseous exchanges can be measured.

For the maintenance of respiration and movement of trypanosomes the blood plasma of the animal from which the trypanosomes are taken can be replaced by serum from other animals and even by broth and simple solutions.

The spontaneous death of trypanosomes in originally suitable media is explained by the appearance of products of metabolism or disintegration. These are apparently necessary in a definite weak concentration. This destructive action can be prevented by blood serum or broth. The action of this is probably not due to the addition of nutritive material, but to a definite antagonistic action upon the injurious substances.

Respiration and movement in trypanosomes run parallel, but there is some respiration even when the parasites are completely at rest.

Haemoglobin is not a necessary [illegible] of oxygen for trypanosomes.

BRITISH MUSEUM

SCHMIDT (Fritz) & DE OLIVEIRA (Mano). **Mal de Cadeiras und seine Behandlung mit Bayer 205.** [Mal de Caderas and its Treatment with Bayer 205.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1924. Mar. Vol. 28. No. 3. pp. 91–100. With 2 charts.

The authors have carried out experiments with small animals and with equines. The strain used for the guinea-pigs, rabbits, and dogs was originally derived from a mule.

Among the small animals guinea-pigs were the most useful. Inoculation permitted a prompt diagnosis to be made of suspected cases in equines, and the persistence of trypanosomes in the blood renders a supply of infective material certain.

Unsatisfactory results were obtained in some cases with rabbits. In some the inoculations failed, while when infection did occur trypanosomes were often discoverable in the blood only a short time before death. However, rabbits are preferable to guinea-pigs in the respect that they develop clinical evidence of infection, while in guinea-pigs no symptoms save wasting are observed. In rabbits symptoms appear within 15–25 days, and comprise swelling of the lips, eyelids, nose and ears. These are followed by discharge from the eyes and nose, and finally marked wasting sets in. There may be no recognizable lesions in any of the viscera after death.

The authors found dogs to be the most suitable animals for maintaining the strain of trypanosomes, but it was noted that while guinea-pigs were readily infected from equines, primary inoculations into dogs sometimes failed, and dogs were always readily infected from guinea-pigs. In dogs enlargement of the spleen and lymphatic glands are constant, but no evidence of paralysis has ever been observed.

In all, 40 small animals have been treated with Bayer 205, and in no case has a failure been recorded, in spite of the fact that intervention was postponed until the disease was in the last stages.

Their experience was that a single dose effected a cure, save in one case of a rabbit. In this particular instance the animal had been infected for some time, and trypanosomes reappeared after a dose of 0·5 g. had been given.

Undesirable results have not been observed in any of the small animals after inoculation, save that in two guinea-pigs inflammation developed at the site of injection, which in one case went on to necrosis. This, however, did not prejudice the result. Trypanosomes invariably disappeared from the blood the day after the drug was given.

Dogs which have been cured have been tested up to 114 days after by re-inoculation, but the result has invariably been negative.

The drug has been used as a prophylactic, and it has not been found possible to infect small animals within a month of the protective injection. [It does not appear to be stated whether this is a maximum or minimum period.]

As a result of these experiments the treatment of experimentally and naturally infected equidae was undertaken.

Full details are given of four natural cases and two experimentally infected ones.

Two animals (a mule and a mare) were given doses of 2 g. and 3 g. respectively a fortnight and six weeks before inoculation with 10 cc. of blood containing large numbers of trypanosomes. Neither became infected.

The disease is not common in Southern Brazil where these observations were made, and in consequence the number of cases available

for treatment was small. The authors found that 7 to 9 grammes of the drug were sufficient to effect a cure.

They found that the dose should be divided into three separate quantities of 2, 2, and 3, or 3, 3, and 3 g., and given at intervals of a week.

The first natural case was in a mule. In this instance a definite diagnosis was not arrived at until after the mule was dead, experimentally infected animals failing to develop infection until the death of the mule had occurred.

The drug was injected in a 10 per cent. solution in physiological salt solution, in some of the cases subcutaneously and in others intravenously. In one case the animal after having improved markedly under treatment lost ground again, and showed evidence of loss of control of the hind legs. This was successfully treated with two doses of strychnine. There was swelling and inflammation of the coronets of both fore feet.

The first animal experimentally infected was a mule. Trypanosomes were discoverable in its blood on the fourth day after inoculation. Trypanosomes disappeared from the blood on the day after the first dose of 3 g. of Bayer 205 had been given intravenously, and did not reappear. A second dose was given a week later.

Subsequently the mule was twice inoculated with blood containing large numbers of trypanosomes. The doses given were 5 to 10 cc. The mule resisted re-infection. A mule and a mare which had been given 2 and 3 cc. of Bayer 205 by intravenous injection resisted infection with virulent blood injected after intervals of 2 and 6 weeks.

TEJERA (Enrique). **Investigaciones hechas con el "205" en el tratamiento de la tripanosomiasis que ocasiona le "derrengadera" de los equinos de Venezuela.** [Investigations in the Treatment of Horses affected with Trypanosomiasis in Venezuela by Bayer 205.] —*Gac. Méd. de Caracas.* 1924. June 30. Vol. 31. No. 12. pp. 177–180. (Discussion pp. 180–183.)

Trypanosoma venezuelense kills hundreds of horses in Venezuela every year. Large outbreaks occur throughout October and November and a few cases are seen in March; this is the period of the rainy season. After a series of experiments on smaller animals—rats, guinea-pigs, goats—as to the curative effects of Bayer 205 the drug was tried on a large number of infected horses with good results, provided the dose injected was sufficiently large. Smaller doses led to a marked improvement of symptoms, but the trypanosomes could still be found in the blood. A single injection, even of 4 gm., does not suffice, but 3 gm. at an interval of 10 days proves effectual. For prophylaxis 2 gm. should be injected every six months.*

VOEGTLIN (C.), DYER (H. A.), & MILLER (D. W.). [**On Drug Resistance of Trypanosomes with Particular Reference to Arsenic.**]—*Jl. Pharmacol. & Exper. Therap.* 1924. Vol. 23. No. 1. pp. 55–85. With 2 figs. [Summarized in *Experiment Station Record.* 1924. Aug. Vol. 51. No. 2. p. 181.]

Resistance to drugs on the part of trypanosomes is special adaptation of protoplasm to injurious environment. The resistance to arsenic

* Summarized by Dr. H. Harold Scott.

can be increased by previously injecting the animals treated with Arsphenamin. The change is a more or less specific change in the protoplasm of the parasite. The resistance can be reduced temporarily by passing the strain through another mammalian host. Experiments indicate that virulence has no relationship to arsenic resistance.

The detoxicating effect of certain sulphydril compounds on the arsenoxid action can be demonstrated upon strains with a high arsenic resistance as well as on normal strains.

SHORTT (H. E.) & SWAMINATH (C. S.). **Note on the Infection of a Mouse by means of Bed-Bugs, *Cimex hemiptera* Fabr., fed on the Peripheral Blood of a Case of Kala-Azar.**— *Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 965–966.

Bed-bugs were fed upon cases of kala azar showing parasites in the peripheral blood. The bugs were dissected after a lapse of nine days and the dissected guts were emulsified in normal saline and injected intraperitoneally into mice. A minimum period of nine days was allowed to elapse because dissection and microscopic examination have shown that three to six days are required for the flagellation of ingested forms.

Five mice were injected, three field mice and two white mice; four survived. Three of the four were negative and the last positive. In the cases of one of the negative mice and the positive mouse the interval elapsing between inoculation and examination was 123 days. The presence of the parasite in the infected mouse was detected by obtaining cultures from its spleen. The parasite was not found microscopically.

NAPIER (L. E.). **The Reaction of the Blood in Kala-Azar.**— *Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 719–732. With 4 graphs.

——. **The Preparation of N.N.N. Media of Different Hydrogen-ion Concentrations.**— *Ibid.* pp. 733–736. With 6 graphs.

These papers do not lend themselves to abstraction as they are full of detailed technique and must be consulted in the original by those interested.

NIESCHULZ (O.). **On a Case of Eimeria Infection in a Cat (*Eimeria felina* n.sp.).**—*Tijdschr. v. Diergeneesk.* 1924. Feb. 15. Vol. 51. No. 4. pp. 129–131.

The parasite was found in the faeces of a cat in Utrecht by the salt concentration method of NÖLLER and OTTEN, but was present in small numbers only. Most of the oocysts had already sporulated when they came under examination.

The oocysts (10) measured 21 μ–26 μ in length, 13 μ to 17 μ in breadth, and had a form index of 0·5 to 0·73. The double contoured envelope was in some cases flattened at one pole, but no definite micropyle could be seen. The cyst wall is described as having externally a thin refractile zone and a thin additional contour line internally. In the completely sporulated oocyst the sporocysts were elongated ovals in shape and showed Stieda's corpuscle. A small residual body was always present.*

* Summarized by Dr. W. H. Andrews, M.R.C.V.S.

ADLER (S.). **A Note on *Plasmodium agamae* (Wenyon, 1908).**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 131–133. With 1 text fig.

The author describes a pigmented haemocytozoon in *Agama colonorum*, which he believes to be identical with that described by WENYON in the Soudan in 1908.

Asexual forms, trophozoites, and schizonts were numerous, and schizogony occurred in the peripheral blood. The name should therefore be *Plasmodium agamae* and not *Halteridium agamae*.

STEPHENS (J. W. W.) & GORDON (R. M.). **The Crescent and the Red Cell.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. Vol. 18. No. 2. pp. 207–210. With 4 plates.

In their plates the authors figure variations in the relationship and form of the red corpuscles and crescents seen in films made from a case of malaria in the Federated Malay States.

While they feel unable to form a definite opinion upon the point, the authors have a general impression that the crescents are external to the red corpuscles.

GOZZI (C.). **Alcune osservazioni sulla piroplasmosi in Albania nel cavallo, nel bue, nel cane.** [Piroplasmosis of the Horse, Ox and Dog in Albania.]—*La Clin. Vet.* 1924. July 23. Vol. 47. No. 7. pp. 381–387. With 1 coloured plate.

The author figures and describes organisms found in smears of blood and from the internal organs of horses, cattle and dogs in Albania. Rounded and ring forms predominated, and multiple invasion of corpuscles was observed. Forms bearing some resemblance to "blue bodies" were found, but these the author finds it difficult to interpret.

No experiments were carried out.

DONATIEN (A.), LESTOQUARD (F.), & SAUSSEAU (L.). **Piroplasmes trouvés dans un cas de jaunisse des muletons du Poitou.** [Piroplasms found in the Blood of a Young Mule affected with Jaundice in Poitou.]—*C. R. Soc. Biol.* 1924. May 23. Vol. 90. No. 17. pp. 1308–1310. With 1 text fig.

Jaundice is the cause of serious losses among mule foals in Poitou, and as the symptoms presented resemble those of piroplasmosis the authors examined the blood and found 5 per cent. of the corpuscles containing parasites. The forms found included anaplasma-like forms, pear, ring, and cross forms. The parasite very closely resembled *Nuttallia equi*.

The suggestion is put forward that the infection is transmitted during gestation. MESNIL, in a note, draws attention to the fact that *Nuttallia equi* and *Piroplasma caballi* have now both been detected in France.

LEVADITI (C.), NICOLAU (S.), & SCHOEN (R.). **La microsporidiose du lapin ; ses relations avec la rage.** [Microsporidiosis of the Rabbit. Its Connexion with Rabies.]—*C. R. Acad. Sci.* 1924. Jan. 7. Vol. 178. No. 2. pp. 256–258.

The authors have already published an account of *Encephalitozoon cuniculi*—the cause of enzootic encephalitis in the rabbit—and they

have drawn attention to the resemblance between it and the microsporidial parasites of insects, fish, reptiles, etc. It is the first microsporidium to be observed in a mammal.

They have been able to discover spores in the urine of infected animals and to trace the development of the cysts in the straight tubes of the kidneys. The escape of the spores *via* the urinary system suggests that the method of infection is *via* the alimentary canal through urine-soiled food.

An emulsion of brain substance containing a small number of spores was injected intraperitoneally into several mice. One of these died 18 hours after inoculation. In the peritoneal exudate a large number of spores were found within intracellular cysts. The parasite was also present in the liver.

In view of these findings and in view of the resemblance between encephalitis of the rabbit and rabies the authors think that rabies may possibly be due to a microsporidium. In support of this view they point out that certain microsporidia develop in the nervous system. Further, the virus of rabies develops in the salivary glands and is present in the saliva, while the encephalitozoon is excreted in the urine. Negri bodies have the appearance and staining affinities of microsporidian cysts, and they possibly represent pansporoblasts.

Experiments are in hand with a view to verifying this hypothesis.

LEVADITI (C.), NICOLAU (S.) & SCHOEN (R.). **Nouvelles recherches sur l'*Encephalitozoon cuniculi*.** [New Researches on the *Encephalitozoon cuniculi*.]—*C. R. Soc. Biol.* 1924. Mar. 21. Vol. 90. No. 10. pp. 662–666. With 3 text figs.

Encephalitozoon cuniculi is the microsporidial parasite of enzootic encephalitis of the rabbit.

The mature spores cannot be stained by Laveran or Giemsa after alcohol fixation owing apparently to the presence of a resistant envelope. Young forms acquire a deep purple tint by these methods. Fixation of smears with Bouin-Brasil renders the envelopes more permeable and permits the staining of the spores by safranine-eosin-polychrome methylene blue of Unna and by Mann's method. By the latter method the spores are bright red in colour. Methods used for the staining of bacterial spores are useless. The authors have achieved staining by using the methods described by GUYÉNOT and NAVILLE, that is to say, by treating the smears before fixation with normal soda, hydrochloric acid and sulphuric acid in 5 per 1,000 strength for 2 to 4 minutes.

Smears treated with hydrochloric acid, then stained with iron haematoxylin, show in the spores one or two chromatin granules. A figure shows the varying appearance of the spores.

The phases of development of the parasite have been studied with material from the peritoneal cavity of the rat and from the brain of the mouse. In the former mononuclear cells containing masses of spores and endothelial cells containing pansporoblasts have been observed. Rabbits can be infected by intravenous inoculation. Dogs appear to be susceptible. Rats can be infected by intraperitoneal inoculation.

In mice cysts are found in the brain and also perivascular infiltrations. Microsporidial cysts have been found in the brains of mice which have

not been inoculated. The mouse is therefore apparently affected naturally with a similar parasite.

An attempt to infect a macacus monkey by intra-cerebral inoculation apparently failed.

LIGNIÈRES (J.). **Estudio y Profilaria de las Piroplasmosis, Babesiellosis y Anaplasmosis Bovina en la República Argentina.** [Protective Measures against Bovine Piroplasmosis, Babesiellosis, and Anaplasmosis in the Argentine.]— *Revista Zootécnica.* 1924. May 15. Vol. 11. No. 128. pp. 129–146.

DISEASES DUE TO METAZOAN PARASITES.

ORTLEPP (R. J.). **On a Collection of Helminths from Dutch Guiana.**— *Jl. Helminthology.* 1924. Feb. Vol. 2. No. 1. pp. 15–40. With 14 text-figs.

This paper contains an account of 38 species of helminths from vertebrate hosts.

From the veterinary point of view interest attaches to one of these, viz., *Dirofilaria immitis*, in that a single specimen (broken) was obtained from the heart of a domestic cat.

The new species represented in the collection were *Protospirura bonnei* from the stomach of a rat, *Protospirura guianensis* from the oesophagus of a monki-monki, and *Setaria nudicauda* from an undetermined species of deer.

MHASKAR (K. S.). **A Note on the Reliability of Post-Treatment Diagnoses of Helminth Infections.**— *Indian Jl. Med. Research.* 1924. Jan. Vol. 11. No. 3. pp. 743–747.

This paper is intended to show the period that must be allowed to elapse if a reliable diagnosis of helminth infections is to be made after treatment. The greater part of the paper is occupied by tabular statements regarding the results obtained.

The observations were made upon convicts, who were treated with betanaphthol, thymol, carbon tetrachloride and oil of chenopodium. The first two were given in single doses of 50 grains, carbon tetrachloride in a single dose of 5 cc. and oil of chenopodium in 3 cc. dosage, divided into two parts and given at an hour's interval. The stools were examined by the author's floatation method twice daily for 15 days. Santonin was also used in single doses of 5 grains for the treatment of convicts heavily infected with round worms.

The conclusions drawn were as follows :—

Betanaphthol, thymol, carbon tetrachloride and santonin have a fleeting toxic effect, lasting for three days, on the ovulation of hookworms and round worms. Oil of chenopodium is more toxic for these worms, and its effects are evident up to the twelfth day of treatment.

None of these drugs, in the dosages given, are toxic for whipworms.

The diagnosis of hookworm, round worm, and whipworm infections can reliably be carried on after the fourth day in the case of beta-

naphthol, thymol, carbon tetrachloride, and santonin treatments. With oil of chenopodium, the diagnosis, to be reliable, should not be undertaken until the twelfth day after treatment.

BHALERAO (G. D.). **A Contribution to the Knowledge of the Trematode Parasites of the Food Mammals of Rangoon.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 139–156. With 3 plates.

This paper is the outcome of examination of trematodes in bullocks, cows, buffaloes, goats, sheep and pigs slaughtered at Rangoon.

The parasites found include :—

Fasciola gigantica, Cobbold ...	bullocks, cows, buffaloes
Paramphistomum cervi, Zeder	liver *Bos indicus*
Eurytrema dajii, n. sp., ...	liver *Bos indicus*
Fasciolopsis fülleborni, Rodenwaldt	intestine pig
Testifrondosa cristata, n. sp.	intestine pig

Testifrondosa n.g. Diagnosis of the genus. Psilostominae. Body covered with scales. Oral sucker smaller than the ventral, latter drawn out posteriorly into a sac-like prolongation. Prepharynx small, pharynx small and globular, oesophagus short. Intestinal caeca nearly reaching the posterior end of the body, genital pore near the intestinal fork. Cirrus sac much elongated, extending beyond the ventral sucker and containing vesicula seminalis. Pars prostatica and Laurer's canal present. Testes branched, in posterior half of the body, one behind the other. Shell gland central, ovary anterior to testes. Receptaculum seminis present. Vitellaria lateral, meeting in middle line posterior to testes. Uterine coils between the shell gland and the cirrus sac. Excretory canal pear-shaped. Eggs large, operculated.

Host *Sus cristatus* (Wagner, 1909).

Type species :—*Testifrondosa cristata*, n. sp. The mature parasites measure from 6 to 8 mm. by 2·5–3·5 mm. The eggs measure 110μ to 130μ by 70μ to 80μ.

Eurytrema dajii. Thirty to forty specimens were found. The parasite measured 5 to 6·7 mm. by 3·5 to 4 mm. They were red in colour and very sluggish. They appeared roundish in their natural habitat, but flattened out when placed in warm water. At the posterior extremity there is a tongue-like appendage. The genital pore is nearer the oral than the ventral sucker. The vitelline glands are 10 to 13 groups on each side composed of slender acini. The uterus becomes visible after the shell gland. It first coils posteriorly, then passes anteriorly between the right testes and the ventral sucker to continue, still coiled, on the right side of the latter, where it joins a long thin muscular vagina.

The parasite agrees with *Eurytrema pancreaticum* (Janson) in the above-mentioned characters. It differs, however, from that species in the following points :—The cuticle carries small square scales measuring 20μ to 50μ. These are thinly distributed and are absent from the edges. The ventral sucker is slightly larger than the oral. The cirrus sac is elongated and tapers posteriorly. It extends from a little behind the intestinal fork to a little in front of the ventral sucker. It is inclined slightly to the left of the middle line. Laurer's canal proceeds anteriorly from the ovary towards the ventral sucker a little behind which it terminates.

BLACKLOCK (D. B.) & THOMPSON (M. G.). **Human Schistosomiasis due to *S. haematobium* in Sierra Leone.**— *Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 211–234. With 1 plate and 4 text figs.

The following is the authors' summary :—

"1. During an investigation into the prevalence of Schistosomiasis in certain districts of the Protectorate of Sierra Leone, infection due to *S. haematobium* was the only type of the disease found.

"2. *Physopsis* c.f. *globosa*, Morelet, was proved to be the intermediate host ; the infection rate in the mollusc with cercariae of *S. haematobium* was often very high, *e.g.*, 42 per cent. in a water latrine.

"3. A description is given of the morphology of the cercaria of *S. haematobium* ; it differs markedly from the description of this cercaria at present accepted.

"4. A critical analysis of the basis of the existing description is undertaken.

"5. Some facts relating to the bionomics of *Physopsis* c.f. *globosa* are mentioned ; experiments showed that this snail was resistant to drying to an unexpected degree.

"6. Of snails placed on mud in the shade a large percentage survived for a fortnight when the water was drained away gradually."

VEGLIA (F.). **Preliminary Notes on the Life-History of *Oesophagostomum columbianum*.**— *Union of S. Africa Dept. of Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 811–823. With 4 Plates. (1924. Pretoria : Govt. Printing & Stationery Office.)

This paper contains observations regarding the life-history of *Oesophagostomum columbianum*, a parasite which next to *Haemonchus contortus* is the most serious cause of parasite disease of sheep in South Africa.

The post-embryonic life of *Oesophagostomum columbianum* is divided by metamorphoses into four larval and an adult stage.

The first two stages are passed in the outside world. During the third stage the parasite is taken in by the sheep, and the final two stages are entirely parasitic. Reference must be made to the original for anatomical details of the larval phases.

The parasitic life is passed wholly in the intestine. Normally the larvae become encysted in the mucous membrane of the large intestine, but they may be found further forward on occasion. In severe infestations the diarrhoea may cause the evacuation of the majority of the larvae.

The minimum periods observed for parasitic development in young lambs may be indicated as follows :—The second ecdysis completed in the first day after infection. On the second day the larvae penetrated the mucosa and encysted. On the fourth day they were in lethargus undergoing the third ecdysis. On the fifth day they were found in the active period of the fourth day and engaged in completing the third ecdysis. On the sixth day larvae began to emerge from the cysts in the mucosa. By the twenty-sixth day a few worms had completed the fourth ecdysis, and by the thirtieth day most of the worms were adults.

The cysts after evacuation usually heal, but the calcareous and caseous nodules sometimes found result from accidental infections with bacteria.

GOODEY (T.). **The Anatomy of** *Oesophagostomum dentatum* **(Rud.) a Nematode Parasite of the Pig, with Observations on the Structure and Biology of the Free-Living Larvae.**—*Jl. Helminthology.* 1924. Feb. Vol. 2. No. 1. pp. 1–14. With 15 text figs.

This paper contains an account of the adult worm, of the first and second stage larvae, and some observations on the biology of the ensheathed larvae.

For details of anatomical structure the original paper should be consulted. The following are the principal points referred to in connection with the biology of the ensheathed larvae.

The ensheathed larvae are positively geotropic, and show no inclination to climb up the sides of the containing vessel. They are capable of resisting desiccation for one or two days. At room temperatures their movements are slow, but when gradually warmed to 37° C. they become very active. They differ from ancylostome larvae in showing no evidence of positive thermotropism. The larvae appear to be incapable of penetrating sound skin.

CAMERON (T. W. M.). **Dochmoides : A New Genus for the Hookworm** *" Uncinaria " stenocephala* **Railliet.**—*Jl. Helminthology.* 1924. Feb. Vol. 2. No. 1. pp. 46–50. With 5 text figs.

The importance of this worm in the fox-breeding industry appears to warrant a new description, more particularly as the older descriptions are incomplete.

The material examined was from a British fox which died in captivity. Since the type of the genus *Uncinaria*, viz. *U. vulpis*, cannot be identified from the existing description, it appears to be correct to allow this name to lapse and to propose a new one, and, accordingly, *Dochmoides* is suggested.

The time does not appear to be ripe for the division of the *Ancylostomidae* Looss into sub-families.

CAMERON (T. W. M.). **On** *Gaigeria pachyscelis* **Railliet and Henry, 1910, a Nematode Parasite of Ruminants.**—*Jl. Helminthology.* 1924. Feb. Vol. 2. No. 1. pp. 41–45. With 7 text figs.

This parasite was originally described by RAILLIET and HENRY from material sent by GAIGER from India in 1910. GEDOELST reported its occurrence in the Belgian Congo in 1916.

A new examination of the parasite has been undertaken because the earlier description was incomplete and difficult to obtain.

Previous material was obtained from the sheep, and possibly also from the cow, but there appears to be some doubt about the latter.

The material in the present instance was obtained from a goat in India.

MONNIG (H. O.). **South African Parasitic Nematodes.**—*Union of S. Africa Dept. of Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 435–478. With 46 figs. (1924. Pretoria : Govt. Printing & Stationery Office.)

A paper of this nature does not lend itself to abstraction and must be consulted in the original by those interested.

DE BLIECK & BAUDET. **Tetrachloorkoolstof abs Wormmiddel bij Paarden.** [Carbon Tetrachloride as an Anthelmintic for Horses.] —*Tijdschr. v. Diergeneesk.* 1924. Apr. 1. Vol. 51. No. 7. pp. 257–262.

A not inconsiderable portion of this paper is a survey of previous results obtained by the authors, DEMNITZ, HALL, and others in the treatment of horses with carbon tetrachloride.

From this it may be gathered that there are indications that foals are less susceptible to the toxic action of the drug than adult horses; that there may be a risk attaching to the administration of the drug by means of the stomach tube unless the tube is passed right into the stomach.

Carbon tetrachloride appears to be a suitable drug for the destruction of ascarids and strongylids, while carbon bisulphide is preferable for gastrophiles and chenopodium for cylicostomes.

It is noted that it is not possible to distinguish between infections with strongylids and cylicostomes by examination of the eggs present in the faeces.

The new material incorporated in the present paper refers to the treatment of five horses.

Case 1. A horse weighing approximately 1,000 lb. was given 80 g. of carbon tetrachloride as an emulsion in gum arabic. There was no disturbance of health.

Case 2. A horse of about 900 lb. weight was given 80 cc., not as an emulsion (actual method not stated). No disturbance of health.

Case 3. This animal as a 2-year-old had been given 200 g. of the drug without causing any disturbance. It was treated for a second time as a 3-year-old with 65 g. It had been used in the interval for a number of experiments and was in rather poor condition. Apart from a slight rise of temperature lasting for 4 days no disturbance of health was noted.

Case 4. Eighteen months old animal in rather poor condition. Dose of carbon tetrachloride administered, 35 g. No untoward result.

Case 5. A 2-year-old which had been used for surra experiments, and which was in poor condition, weighing only some 650 lb. The dose used was 65 g. in gum arabic. There was a slight rise of temperature.

The authors find that carbon tetrachloride is an excellent drug for the expulsion of gastrophilus larvae, ascarids, oxyuris, and strongylids. They recommend a dose of 0·1 cc. per kilogram body weight as being safe but efficient.

It is suggested, although the authors have not practised it, that the stomach tube should be passed right into the stomach and that water should be passed through it before it is withdrawn to make sure that none of the drug remains in it. It is not necessary to make an emulsion with gum arabic, but by doing so the risk of irritation of the mucous membrane is reduced.*

* Summarized by Dr. W. H. Andrews, M.R.C.V.S.

CHANDLER (W. L.). **[On the Vermicidal Value of Iodin, with Notes on Two New Iodin Preparations and Suggestions as to their Probable Therapeutic and Disinfectant Values.]**—*Michigan Sta. Quart. Bull.* 1924. Vol. 6. No. 3. pp. 112–119. [Summarized in *Experiment Station Record.* 1924. July. Vol. 51. No. 1. pp. 79–80.]

The author claims to have produced a crystalline form of iodine which differs from sublimed iodine. It is more readily soluble in water, castor oil and other iodine solvents. A saturated aqueous solution contains 0·04 per cent. The exact nature of this preparation of iodine is still problematical. This form of iodine is said to be active against intestinal parasites, but to be valueless against stomach parasites in the sheep.

It is also claimed that a new protein iodine compound has been prepared which liberates free iodine in the stomach of the sheep. It is said to be the most promising form of iodine against the stomach worms of sheep.

ISBECQUE (G.). **Recherche d'anticorps spécifiques chez les porteurs de vers intestinaux.** [The Detection of Specific Antibodies in Carriers of Intestinal Parasites.]—*C. R. Soc. Biol.* 1924. Mar. 21. Vol. 90. No. 10. pp. 691–692.

The author outlines the technique which he has applied and comes to the conclusion that deviation of the complement is constant when the corresponding antibody is present. The reaction is not absolutely specific.

CURSON (H. H.).* **Notes on** *Glossina pallidipes* **in Zululand.**—*Bull. Entom. Research.* 1924. May. Vol. 14. No. 4. pp. 445–453. With 1 map & 3 plates.

The notes published in this paper were collected while the author was carrying on an investigation into nagana. The paper is divided up into short sections dealing briefly with (1) the type of country frequented; (2) fly belts; (3) seasonal and meteorological influences; (4) method of attack; (5) choice of hosts; (6) relation of tsetse to water; (7) influence of colour; (8) glossina repellent; (9) influence of moving objects; (10) human habitations; (11) travelling habits of glossina; (12) circumstances under which cattle are infected by glossina; (13) behaviour of glossina on dead game; (14) effects of European settlement in glossina country; (15) influence of grass fires; (16) possibility that fly area in Southern Portion of Lower Umfolosi Division is extending; and (17) predatory enemies of glossina.

POTTS (W. H.). **A New Variety of** *Glossina schwetzi*, **Newstead & Evans, from the Belgian Congo.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 205–206. With 1 text fig.

Glossina schwetzi var. *disjuncta* var. nov. Colour and pattern as in typical *G. schwetzi*, but the distal processes of the harpes short and detached, and the median process more prominent.

*1923. Vol. 11, No. 1, p. 7, line 19 from bottom. Paper on "Nagana and the Tartar Emetic Treatment." The author's name should read "CURSON (H. H.)," *not* "CARSON (H. H.)."

DELANOË (P.). **Myases du bétail du Cercle des Doukkala causées par les larves d'une mouche sarcophile,** *Wohlfartia magnifica* **Schiner 1862.** [Myiasis of Cattle caused by the Larvae of *Wohlfartia magnifica*.]—*Bull. Soc. Sci. Nat. Maroc.* 1922. Dec. 30. Vol. 2. Nos. 7 & 8. pp. 132–136. With 2 text figs.

This fly has been recognized as being responsible for myiasis in many species of animals in Russia, France, Germany, Roumania and elsewhere. The author has given attention to the subject for the last three years in Morocco, and has never been able to identify any fly as causing myiasis other than *W. magnifica*. The Camelidae appear to be the worst sufferers. In these animals he has encountered infestations where there was no primary wound. This he has not observed in either cattle or horses. The vulva of the camel is the favourite place for the deposition of the eggs. Since the larva attack undamaged tissues it is not in the least surprising that the slightest wound is likely to become infested by them. The author advises all owners to wash the vulva twice weekly with water containing cresyl, for the reason that it appears to be the odour of this always moist and greasy orifice which attracts the flies. Once infestation has occurred attempts at cure involve extensive surgical interference.

Next to the camel the horse is the principal sufferer, and wounds almost invariably become infested with maggots during the fly season.

The author has collected larvae and has hatched out flies. At ordinary temperatures this requires 16 to 18 days.

The less frequent occurrence of the myiasis in cattle is probably due to the fact that these do not injure themselves so frequently as horses.

PATTON (W. S.). i. **Note on the Occurrence of** *Hypoderma lineatum* **Villiers, in the Punjab.** ii. **Note on the Second Stage Larva of** *Hypoderma crossi* **Patton.** iii. *Gasterophilus crossi* **sp. nov., Parasitic in its Larval Stage in the Stomach of the Horse in the Punjab.**—*Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 961–963.

i. The author notes the presence of *H. lineatum* among a collection of larvae and adults made by CROSS.

Hypoderma crossi, though most commonly found in the skins of goats, also occurs in the skins of cattle. *H. lineatum* is mainly a parasite of cattle, but also occurs in the skins of goats.

ii. A description is given of what the author considers to be the true second stage of this larvae. He is in disagreement with LAAKE, but he is not satisfied that the evidence brought forward by LAAKE regarding the occurrence of 5 stages in life of the Hypoderma larva is satisfactory. In this GEDOELST agrees with him.

iii. The author describes a new species, *Gasterophilus crossi*, which CROSS bred from larvae collected from the excreta of horses.

The following is a short description:—Average length of two females with ovipositors extended 13 mm. General colour black with white and light yellow hairs. Frons and face light yellow, orbital margins black, ocellar triangle dark brown to black. Antennae, including arista, whitish yellow. Thorax covered dorsally with light yellow hairs throughout, pleural tuft consisting of whitish hairs, scutellum with yellowish white hairs. All femora dark brown, apices and most of the ventral surface light yellow; fore- and mid-tibiae light brown,

hind-tibiae light yellow; all tarsi light yellow. Abdomen black throughout and sparsely covered with white hairs. Wings hyaline, veins brown, venation similar to that of *Gasterophilus veterinus*.

BLACKLOCK (B.) & THOMPSON (M. G.). **Rat-Fleas in Freetown, Sierra Leone.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 135–137.

The authors give the identification of over 600 fleas removed from 62 black and 38 brown rats.

Importance attaches to the findings in connection with the transmission of plague.

SHARIF (M.). **The External Morphology and Bionomics of the Commonest Indian Tick** (*Hyalomma aegyptium*).—*Agric. Res. Inst. Pusa, India. Bull. No.* 152. 1924. pp. 1–23. With 5 plates (2 in colour).

For the morphological details of this ectoparasite reference must be made to the original paper.

When placed in suitable surroundings in the laboratory females began to lay eggs from 9–12 days after quitting their host. Oviposition continued for about three weeks during which time 6,000–8,000 eggs were laid.

The period required for hatching varies with the temperature from 3 weeks to 2 months.

In the hot weather the heat of the sun is sufficient to kill larvae exposed to it.

The author has found larvae on the ears of the horse, calf, camel, and buffalo. Larvae require 3 to 5 days for engorgement, and it is stated that the larvae may be red or blue in colour, this variation depending upon whether they have fed upon arterial or venous blood. Moulting requires 5 to 7 days. The nymphs are of a chocolate red colour. Engorgement required 5 to 7 days and the moulting of the nymphs 9 to 15 days.

"Ticks are very rare on the host in the winter season mid-November to mid-February. The adults are very rare on animals, absent in the majority of cases. But it is impossible to find nymphs and larvae on the host."

DU TOIT (P. J.). **Sheep Scab: the Infectivity of Kraals.**—*Union of South Africa. Dept. of Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 223–229. With 22 figs. (1924. Pretoria: Govt. Printing & Stationery Office.)

Although in an earlier investigation, SHILSTON (1916) and BEDFORD published results indicating that ten days is a sufficient period to free a kraal from sheep scab infection, certain objections of some weight were raised against their experiments. The present experiments were carried out with a view to meeting these objections.

The experiments were divided into two parts. The first was designed to furnish an answer to the question as to whether a period of 17 days was sufficient to free a kraal from infection, and the second to show whether an infected kraal could re-infect scabby sheep immediately after dipping.

Details are given of the manner in which the objections raised to the earlier experimental results were met, in the matter of making the tests as severe as possible, and the result indicated that a period of 17 days was sufficient to render a very heavily infected kraal safe for healthy sheep.

In the second experiment severely infected sheep were dipped twice at an interval of 9 days in a lime and sulphur dip and replaced in the infected kraal immediately after the second dipping. The interval between the dippings was also passed in the infected kraal. None of the sheep showed any sign of re-infection.

AUSTEN (E. E.). **Additional Records of Palestine Tabanidae, with Descriptions of New Species.**—*Bull. Entom. Research.* 1924. May. Vol. 14. No. 4. pp. 421–432. With 4 text figs.

BAYLIS (H. A.) & DAUBNEY (R.). **A further Report on Parasitic Nematodes in the Collection of the Zoological Survey of India.**—*Records of the Indian Museum.* Calcutta. 1923. Dec. Vol. 25. No. 6. pp. 551–578. With 20 text figs.

BLACKLOCK (B.) & THOMPSON (M. G.). **Observations on the Classification of certain Schistosome Cercariae.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 235–237.

BRUG (S. L.). **Notes on Dutch-East-Indian Mosquitos.**—*Bull. Entom. Research.* 1924. May. Vol. 14. No. 4. pp. 433–442. With 8 text figs.

EDWARDS (F. W.). **A Synopsis of the Adult Mosquitos of the Australasian Region.**—*Bull. Entom. Research.* 1924. May. Vol. 14. No. 4. pp. 351–401.

FULLER (Claude). **Tsetse in the Transvaal and Surrounding Territories: An Historical Review.**—*Union of S. Africa, Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April, 1923.* pp. 317–378. With 1 folding map and 9 plates. (1924. Pretoria: Govt. Printing and Stationery Office.)

MACGREGOR (Malcolm E.). *Aëdes* (*Stegomyia*) *mascarensis*, **MacGregor: A New Mosquito from Mauritius.**—*Bull. Entom. Research.* 1924. May. Vol. 14. No. 4. pp. 409–412. With 1 text fig.

MATHIAS (Paul). **Cycle évolulif d'un trématode échinostome** (*Hypoderaeum conoideum* **Bloch.**). [The Life History of *Hypoderaeum conoideum*, Bloch.]—*C. R. Soc. Biol.* 1924. Jan. 18. Vol. 90. No. 1. pp. 13–15.

MEGGITT (F. J.). **On the Life History of a Reptilian Tapeworm** (*Sparganum reptans*).—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 195–204. With 1 plate.

NÖLLER (W.) & SPREHN (K.). **Die Entwicklung des Leberegels bis zur Zerkerie in** *Limnaea stagnalis*. [The Developments of the Liver-Fluke to the Cercarial Stage in *Limnaea stagnalis*.]—*Berlin. Tierärzt. Woch.* 1924. July 18. Vol. 40. No. 29. pp. 369–370.

RANSOM (B. H.). **Hookworms of the Genus Uncinaria of the Dog, Fox and Badger.**—*Proceedings of the United States National Museum.* No. 2533. Vol. 65. Art. 20. 5 pp. With 1 plate.

SKRJABIN (K. I.). *Progynopylidium nölleri*, **n.g. n.sp. ein neuer Bandwurm der Katze.** [*Progynopylidium nölleri*, n.g. n.sp., a New Tape Worm of the Cat.]—*Berlin. Tierärzt. Woch.* 1924. Aug. 8. Vol. 40. No. 32. pp. 420–422.

THEILER (Gertrud). **The Strongylids and other Nematodes parasitic in the Intestinal Tract of South African Equines.**—*Union of S. Africa, Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 603–773. With 55 plates. (1924. Pretoria: Govt. Printing and Stationery Office.)

BACTERIAL DISEASES.

EVANS (Alice C.). **The Serological Classification of** *Brucella melitensis* **from Human, Bovine, Caprine, Porcine and Equine Sources.**—*Public Health Reports.* 1923. Aug. 24. Vol. 38. No. 34. pp. 1948–1963. With 1 chart.

The author has carried out simple agglutination tests which confirm the view that by this means *Brucella melitensis* and *Bacillus abortus* are not capable of being separated.

BURNET (Et.) & ANDERSON (Ch.). **Importance de la mammite chez les chèvres porteuses de** *M. melitensis.* [The Importance of Mammitis in Goats that are Carriers of *M. melitensis.*]—*C. R. Acad. Sci.* 1924. Jan. 21. Vol. 178. No. 4. pp. 428–430.

Since the milk of goats that are carriers of *M. melitensis* infection is frequently rich in the organism, while it is rarely found in the blood or the organs, it appears to be probable that the organism maintains itself in the mammary gland.

The authors have had the opportunity of keeping six naturally infected goats under observation for varying periods, and of making post-mortem examinations.

Five of the goats were apparently in perfect health and good milkers, while the other was clinically infected, poor in condition, and yielded milk having a bad appearance.

Details of serum tests, cultivations from the milk, etc., and the post-mortem findings for each of these animals are given.

In five out of the six *M. melitensis* was cultivated from the mammary gland. In the case of the sixth animal the gland was in a condition of complete involution.

The organism was recovered from the mammary and supra-mammary glands in the other animals.

In four of the goats, which were in milk, microscopic examination of the mammary gland revealed the presence of mastitis. In one there was a large multilocular abscess, in the second a circumscribed abscess, and in the remaining two centres showing inflammatory changes.

BURNET (Et.) & DE LAGOANÈRE (J. L.). **Pouvoir pathogène du** *M. melitensis* **et du** *B. abortus* **pour le rat et la souris.** [The Pathogenicity of the *M. melitensis* and *B. abortus* for the Rat and Mouse.]—*Bull. Soc. Path. Exot.* 1924. June 11. Vol. 17. No. 6. pp. 465–467.

In connexion with a search for some animal which would serve as a means of distinguishing *M. melitensis* from *B. abortus* the authors have made bacteriological examinations of 80 grey rats caught in Tunis in a quarter containing some 3,000 goats, of which 5 per cent. were infected with *M. melitensis.* Serum tests do not appear to have been carried out, but the spleen, glands, marrow and liver were used for seed material. In no case was a single colony of *melitensis* found.

Experimentally white rats are as susceptible to *B. abortus* as to *M. melitensis.* They are readily infected by subcutaneous inoculation and by ingestion provided in the latter case a sufficient dose be given. By whatever path the infective material gains access complete recovery follows in a month or two.

Grey and white mice have been infected by subcutaneous inoculation and by ingestion with both organisms. No difference in pathogenicity has been discovered.

Mice are far more susceptible to inoculation than rats, their susceptibility approximating closely to that of the guinea-pig.

They are more resistant to infection by way of the mouth than by subcutaneous inoculation, but they possess a lower degree of resistance than the rat.

Contrary to what is the case in the rat, mice acquire chronic infections and do not recover.

On these grounds the authors suggest that mice may form a reservoir of infection.

Infection does not always lead to the presence of agglutinins in the blood.

QUINLAN (John). **The Susceptibility of Calves to Contagious Abortion when fed on Milk from Infected Cows.**—*Union of S. Africa. Dept. Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 559–600. (1924. Pretoria: Govt. Printing & Stationery Office.)

The blood serum of calves fed upon milk from naturally infected cows sometimes causes agglutination. The titre is not, as a rule, high. The antibodies present in the serum of calves do not persist, and not infrequently disappear even while the diet of infected milk is continued. They always disappear when it is stopped. It is safe to use infected milk for the feeding of calves up to the age of 6 months or so, and the infected milk is not detrimental to their health.

COTTON (W. E.). **The Present Status of Abortion Disease in Cattle, its Spread, Influence of Male and Control.**—*Vet. Med.* 1924. Aug. Vol. 19. No. 8. pp. 463–469.

As indicated in the title, this paper is a summary of the present position regarding abortion. Reference is made to the natural occurrence of abortion in pigs caused by a similar organism. COTTON and SCHROEDER have tried without success to infect cattle naturally from sows by exposure, nor have they succeeded in infecting sows from cattle by exposure. The organisms isolated from natural infections in the two species differ somewhat in their effects upon guinea-pigs inoculated with them. Experiments are being carried out with a view to determining whether two distinct types of bacillus occur. The occasional occurrence of infection in virgin heifers may be due to the continued feeding with milk from infected cows up to the time of sexual maturity, a practice which is followed in some pure breed herds. Failure to abort in pregnant cows may be evidence of late infection. A positive reaction to the agglutination test is held to indicate existent or past infection; a point which can sometimes be settled by the carrying out of a succession of tests at short intervals.

BEVAN (L. E. W.). **Infectious Abortion. The Use and Abuse of the "De-vitalised" Vaccine.**—*Rhodesia Agric. Jl.* 1924. June. Vol. 21. No. 3. pp. 281–282.

The author briefly explains the nature and uses of "devitalised" vaccine with a view to clearing away misapprehensions regarding these points.

BROCQ-ROUSSEU & URBAIN. **De la réceptivité pulmonaire à l'infection charbonneuse chez le lapin et le cobaye.** [The Susceptibility of the Lungs of the Rabbit and Guinea-Pig to Infection with Anthrax.] —*C. R. Soc. Biol.* 1924. Jan. 18. Vol. 90. No. 1. pp. 4–6.

According to BESREDKA and others, in the rabbit and guinea-pig the skin is the only organ susceptible to infection with anthrax. It is therefore possible, according to this view, to introduce anthrax material into the bodies of these animals without infecting them, provided there is no injury to the skin. In such animals no protection is established. On the other hand, animals can be completely immunized by vaccination of the skin. COMBIESCO holds, however, that the injection of a large dose is sufficient to set up infection, and, further, he has been able to infect by direct inoculation into the lung.

The experiments recorded by Brocq-Rousseu and Urbain aimed at proving whether it was possible to infect *via* the lungs, the skin remaining uncontaminated. Ten guinea-pigs were injected intratracheally with 0·2 cc. of a virulent anthrax culture, suitable precautions being taken to avoid contamination of the skin. Two controls were inoculated intracutaneously and two subcutaneously. All of these died in 2–3 days. Six of those inoculated intratracheally died within 4-5 days of anthrax, the remaining four survived. Two of these were tested a fortnight later with $\frac{1}{8}$ cc. of 2nd anthrax vaccine and died. Five rabbits, with suitable controls, were treated in the same way, the dose being 0·3 cc. Three survived, and when tested three weeks later succumbed to anthrax. The experiment was repeated with guinea-pigs vaccinated by the cutaneous path. Eight vaccinated guinea-pigs were inoculated *via* the trachea and 7 directly into the lung through the chest wall. All survived.

BROCQ-ROUSSEU & URBAIN (Achille). **Sur la cuti-immunité due à la cuti-vaccination anticharbonneuse chez le cobaye.** [Cuti-Immunity against Anthrax in the Guinea-Pig produced by Cuti-Vaccination.]—*C. R. Soc. Biol.* 1924. May 23. Vol. 90. No. 17. pp. 1307–1308.

Three strains of anthrax have been used—(*a*) a strain capable of killing rabbits in a dose of $\frac{1}{10000}$ m.g., (*b*) a "diffuse" strain as described by GRATIA, and an "agglutinated" strain described by the same author.

GRATIA describes the "diffuse" strain as being innocuous to the rabbit by all methods of infection save intradermally, and the "agglutinated" strain as being fatal to the rabbit by all paths. Both of these strains were found to be fatal for the guinea-pig in 3 to 4 days in a dose of $\frac{1}{10000}$ cc. Twenty-four guinea-pigs were used which had previously been subjected to cuti-vaccination. These were inoculated as follows:— Six were inoculated into the kidney with $\frac{1}{30}$ cc. of the virulent culture, and three each were inoculated in the same way with GRATIA'S strains. Two guinea-pigs were inoculated into the thickness of the wall of the large intestine with $\frac{1}{30}$ cc. or $\frac{1}{20}$ cc. of the three cultures. Three were inoculated intraperitoneally and three into the liver with $\frac{1}{30}$ cc. of the virulent culture.

All the animals resisted infection. Twelve controls were inoculated either subcutaneously or intracutaneously with the same three strains and all succumbed.

BOQUET (A.). **Sur l'infection charbonneuse du cobaye par inoculation sous-muqueuse de bactéridies.** [Infection of Guinea-Pigs with Anthrax by Submucous Inoculation.]—*C. R. Soc. Biol.* 1924. Jan. 25. Vol. 90. No. 2. pp. 72–73.

When guinea-pigs are fed with large doses of anthrax spores (*e.g.*, 20 to 50 cg. of 2nd vaccine agar culture) some die in from 4 to 9 days with swelling of the throat. This lesion, which is usual in naturally infected pigs, suggests that the organisms gain access by direct passage through the mucous membrane of the mouth or pharynx.

Experiments designed to show whether this is the case are outlined by the author. Inoculation under the mucous membrane of the tongue or into the muscular tissue of that organ with $\frac{1}{500}$ cc. of second vaccine causes death in 2 to 5 days, like the controls inoculated subcutaneously, and they show cervical oedema which is proportional to the period of survival after inoculation. The tongue is also swollen and there is a small necrotic patch at the seat of inoculation. Exactly parallel results follow inoculation into the mucous membrane of the cheek and the conjunctiva.

GRATIA (André). **Infection charbonneuse et immunité anticharbonneuse obtenues par la voie sanguine.** [Infection and Immunity in Anthrax produced Intravenously.]—*C. R. Soc. Biol.* 1924. June 20. Vol. 91. No. 21. pp. 113–115.

The author is of the opinion that BESREDKA'S theory regarding the susceptibility of the skin and its capacity for producing immunity against anthrax is not justified by the facts. The skin, he points out, is less protected against anthrax infection than the blood. He has shown that the simple injection of broth into the skin reduces its susceptibility to anthrax by the leucocytosis which it provokes.

The author possesses a strain of anthrax which comprises two varieties. One of these, which yields a turbid broth culture, can be injected with impunity into the circulation of rabbits; the other, which gives an "agglutinated" broth culture, is fatal to rabbits by intravenous injections in doses of 1 cc. in 4 to 5 days. If, instead of using culture, blood is taken from a rabbit on the point of death and one injects ·25 to ·5 cc., repeating this in series, at the third passage death may take place as early as the 15th hour. The diffuse type of culture can be injected intravenously, and by repetition of the dose at intervals of 8 days a high degree of immunity can be established, even against the virulent strain.

BOQUET (A.). **Rôle des traumatismes dans l'infection charbonneuse du cobaye par les voies digestives.** [The Part played by Injuries in the Infection of Guinea-Pigs with Anthrax by the Alimentary Canal.]—*C. R. Acad. Sci.* 1924. Jan. 7. Vol. 178. No. 2. pp. 260–262.

PASTEUR, CHAMBERLAND, and ROUX have recorded their observations that laboratory animals, which are so susceptible to other methods of infection, offer an almost complete resistance to infection with anthrax by way of the alimentary tract.

On the other hand, BESREDKA's experiments seem to indicate that in the guinea-pig it is the skin alone that is susceptible to anthrax infection.

It is, however, the general view that natural infection is commonly by ingestion. The author attempts to find some explanation of this apparently flagrant contradiction.

If guinea-pigs are fed with large doses of anthrax spores after 36 hours' starvation, their heart blood will yield positive cultures in 10 to 18 hours after the infecting feed. This occurred in the author's experiments in 6 out of 10 guinea-pigs. The blood was obtained by heart puncture. After this cultures remain sterile.

As only about one guinea-pig in six infected died of anthrax it appears to be probable that many of the animals resist infection contracted by way of the alimentary tract, and behave in the same way as those inoculated intravenously by BESREDKA. Guinea-pigs which have survived the ingestion of massive doses of first and second vaccine administered at an interval of 8 to 10 days succumb to a subcutaneous injection of $\frac{1}{10}$ cc. of second vaccine administered three weeks later.

A further point brought out by the experiments is that all the guinea-pigs, save about one in twenty, which have been bled by heart puncture, 2 to 20 hours after the infecting meal, have died of anthrax with oedema around the seat of the puncture made by the needle. On the other hand, of the animals infected in the same way and not bled, only one in six has died.

Twenty-one fresh guinea-pigs were starved and then fed with large doses of second vaccine. These were divided into five batches and were bled 3, 4, 5, and 20 hours later. Cultures of heart blood were negative in the cases of the animals bled at 3 hours and 20 hours' interval, but positive in the other two batches. The whole of the animals died of anthrax.

Six guinea-pigs (apparently surviving from the last experiment but one described.—Ed.) were shaved, scarified or bruised, and two which were given subcutaneous injections of 2 cc. of Locke's Solution died of anthrax on the fourth to sixth day.

Of nine guinea-pigs of the same batch which were not scarified only one died of anthrax. Seven fresh guinea-pigs which were shaved and scarified were placed in contact as controls to contamination from the exterior. None contracted anthrax.

MAZZETTI (Giuseppe). **Della sorte dei bacilli del carbonchio nel corpo delle cavie morte per infezione carbonchiosa e conservate alla temperatura del ghiaccio fondente.** [The Fate of Anthrax Bacilli in the Bodies of Guinea-Pigs dead of Anthrax kept at 0° C.] —*Pathologica.* 1924. Sept. 1. Vol. 16. No. 379. pp. 452-454.

Anthrax bacilli in guinea-pigs kept at 0°C. after death gradually decrease in number as the interval elapsing between death and post-mortem examination is increased. The organism persists in the blood for longer periods than in the organs. Cultures made from the organs were sterile by the 30th day, but cultures, though scanty, were obtained from the blood on the 41st day.

In a second series of experiments cultures could not be obtained from the spleen after the 7th day, but those made from the liver proved positive up to the 39th day.

GLUSMAN (M. P.). **Negative Resultate bei Immunisierung von Meerschweinchen gegen Milzbrand nach der Methode von Besredka.** [Negative Results in the Immunization of Guinea-Pigs against Anthrax by Besredka's Method.]—*Ztschr. f. Hyg. u. Infektionskr.* 1924. Vol. 102. No. 1/2. pp. 218–223.

The author outlines BESREDKA'S original communication regarding the susceptibility of the skin of the guinea-pig to anthrax infection and their immunization by this path.

Four series of experiments were carried out. In the first of these ten guinea-pigs were treated with first vaccine by rubbing it into shaved skin with a cotton wool tampon. They received a second treatment a week later. After a further period of a week one of the guinea-pigs and one control were treated with second vaccine in the same way. Both died of anthrax. After a further week the remaining nine guinea-pigs were immunized for the third time with vaccine 1. On this occasion the vaccine was rubbed in vigorously. A few days later another of the guinea-pigs and a control were tested with second vaccine. Both died of anthrax. This was repeated with another of the vaccinated animals and a control.

With variations of dosage, etc., these experiments were repeated, but immunization was not achieved.

The authors are unable to find any explanation of the results in the technique or the material used. They suppose that there is some at present unrecognized factor in the production of active immunity which has not been taken into account.

VELU (H.). **Rapidité de l'immunisation du mouton contre le charbon bactéridien par intradermo-vaccination en un temps : possibilité de l'intervention chez les animaux en période d'incubation.** [Intradermal Vaccination of Sheep against Anthrax. The Possibility of Intervening when an Animal is actually in the Incubative Stage.]—*Bull. Soc. Path. Exot.* 1924. June 11. Vol. 17. No. 6. pp. 467–470.

Single dose vaccination against anthrax is the only method that is of practical value in colonies. The first experiments carried out by the author had for their object the determination of the interval elapsing between vaccination and the acquisition of immunity.

Four sheep were vaccinated cutaneously with a dose equal to that employed by the subcutaneous path. At intervals of 72, 48, 24, and 9 hours later they were given 1,000 minimum lethal doses of a culture of the Moroccan strain of the organism subcutaneously. At the same time a control received 5,000 m.l.d. Another sheep was inoculated simultaneously with vaccine into the skin and virus subcutaneously.

Four of the animals resisted infection, although two showed a slight rise of temperature. The animal inoculated 24 hours after vaccination died of anthrax after a period of incubation of 5 days.

With a view to the elimination of possible errors in technique, such as the passage of the vaccine into the subcutaneous tissue, the experiment was repeated. Four sheep were used, and the intervals elapsing between vaccination and test inoculation were 72, 48 and 24 hours, the fourth receiving the two doses simultaneously. Again the animal inoculated after 24 hours died of anthrax, and in this instance after

48 hours only. These results rather suggest that there is a period of susceptibility at 24 hours while before and after this there is a condition of resistance.

With a view to ascertaining whether a vaccine administered intradermally after infection had actually occurred would establish any protection an experiment was carried out as follows :—

Six sheep were inoculated subcutaneously with two carefully measured m.l.d. of culture. This small dose was selected with the object of causing slow development of the disease and thus facilitate observation.

The period of incubation generally runs from 3 to 5 days and deaths occur in 3 to 6 days.

These animals were then vaccinated intradermally 24, 48, 72, and 96 hours after inoculation. The remaining two acted as controls.

Three of the vaccinated animals (24, 48, and 96 hours interval) resisted infection and showed no local or general disturbance. The animal vaccinated 72 hours after inoculation died of anthrax. A rise of temperature, indicating invasion of the blood stream, had begun before the vaccination was carried out. Its death occurred 4 days after vaccination. The controls died 4 and 10 days after inoculation.

LISTON (W. Glen) & SOPARKAR (M. B.). **Bovine Tuberculosis in India. An Outbreak of Tuberculosis among Animals in the Bombay Zoological Gardens.**— *Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 671–680. With 1 text fig.

An account of an outbreak of tuberculosis in the Zoological Gardens, Bombay, believed to have originated from one or more llamas imported from Germany. The disease during the course of a year was responsible for the death or destruction of 30 animals. These included spotted deer, llama, binturong, quail, urial, nilgai, sambar, antelope, Arabian gazelle, Malayan tapir, and Beisa antelope. The outbreak was confined to a single compound—and did not spread to others only a few hundred feet away.

The binturong mentioned was not in the infected compound, but was at some distance from it. The virus isolated from this animal was of the human type, while the whole of the other virus isolated were of the bovine type.

SOPARKAR (M. B.). **Bovine Tuberculosis in India. An Investigation into the Types of Tubercle Bacilli isolated from Animals during an Outbreak of Tuberculosis in the Bombay Zoological Gardens.**— *Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 681–693.

The author isolated 9 viruses. Five of these were from spotted deer, one each from a llama, binturong, an antelope and a gazelle.

The strains were isolated either direct from lesions or after passage through guinea-pigs. When the material for inoculation showed a large number of accidental organisms the emulsion was mixed with an equal amount of normal sodium hydrate and incubated for half an hour at 37° C. The mixture was neutralized with 5 per cent. hydrochloric acid prior to its injection into guinea-pigs. Virulence tests were carried out with rabbits, using doses of ·01 mg.

The strain derived from the binturong could not be distinguished from the human type.

Strains from four spotted deer and a gazelle resembled the bovine type.

The bacilli isolated from the antelope possessed the cultural characters of the bovine type, but were less virulent.

Bacilli from one of the spotted deer and one of the llamas were dysgonic but of low virulence.

KAWAMURA (Y.). **Contributions to the Experimental Study of the Preparation of Blackleg Precipitin Serum.**—*Jl. Jap. Soc. Vet. Sci.* 1924. June. Vol. 3. No. 2. pp. 121–125. [Author's English Abstract.]

The author has tested the methods described by HECHT, MESSUER and LANGE, and OKUDA for the preparation of a blackleg precipitin serum and finds that the organic substances present in the material injected induce the formation of precipitins for " flesh proteins."

The author has therefore devised a broth which is not capable of producing protein precipitins. This has the following composition :—

Distilled water	1,000 cc.
Peptone	50 g.
Grape Sugar or Dextrose ...	50 g.
Sodium Chloride	5 g.

This is tubed and has added to it pieces of chicken liver. It is then sterilized. The method of sterilization is not stated. *B. chauvoei* is said to grow vigorously in this medium, and appears to decrease in virulence. This, it is said, is an advantage in using the cultures for immunization purposes. In the preparation of the precipitin serum the following procedure is adopted. Cultures are grown for 24 hours at 37° C. and then filtered through wire gauze. The filtrate is centrifuged to concentrate the bacilli. Five to eight intravenous injections are given in increasing doses at intervals of 5 to 7 days. Rabbits were used but no indication of the actual doses given appears in the author's abstract.

The serum is collected and stored in ampoules of 1 or 2 cc. capacity. In carrying out the test a piece of the suspected muscle is ground up with 5 to 10 volumes of salt solution. The mixture is kept at room temperature for 24 hours with occasional shaking. It is then filtered until perfectly clear. If cloudiness develops it must be heated in boiling water for 5–10 minutes and filtered through a Berkefeld filter.

The tests are kept at room temperature and are read at 3 hours. [It would appear from a table given that in some of the tests at least they were read at 10, 20, 30, and 60 minutes.] The author states that his serum is useful for the differentiation of *B. chauvoei* from *B. oedematis maligni*, *B. tetani*, *B. welchii* and the bacillus of chicken diarrhoea (NAKAMURA).

LECLAINCHE (E.) & VALLÉE (H.), GLOVER & PINCEMIN. **Charbon symptomatique et gangrène gazeuse chez les bovidés.** [Black-Quarter and Gaseous Gangrene in Bovines.]—*Rev. Gen. Méd. Vét.* 1924. July. No. 391. pp. 357–361.

Clinical observation and bacteriological investigations have shown that in the human subject the condition known as gangrenous septicaemia includes a variety of recognizably different infections. The authors express the view that the disease known as symptomatic

anthrax (black-quarter) is also not a single entity. Several authors have come to the same conclusion, and in the present paper they summarize the evidence collected regarding the true identity of all cases recognized as symptomatic anthrax. The typical *Bacillus chauvoei* is one which is the cause of gas gangrene in cattle, is devoid of pathogenicity for the horse, pathogenic for the calf and guinea-pig. In the latter species it does not form long forms of irregular length in the peritoneum, and is not agglutinated by an "anti-vibrion-septique" serum in dilutions weaker than 1 in 50. *Bacillus septicus*, on the other hand, is non-pathogenic for cattle by subcutaneous inoculation; is highly pathogenic for the horse and guinea-pig, and in the latter produces forms of variable length. It is not agglutinated beyond 1 in 50 by sera which agglutinate the *Bacillus chauvoei* in dilutions of 1 in 20,000 or even more.

The conclusion is therefore drawn that while *B. chauvoei* and *B. septicus* are closely related they can be differentiated. This conclusion has been confirmed by a number of other investigators.

Apart, however, from these clearly recognizable types, these have been encountered in cases of gas gangrene in cattle which clinically resemble black-quarter organisms, which in some cases approximate more or less to *B. septicus* and in others to *B. chauvoei*.

The organisms isolated from these cases have been subjected to systematic examination, and the results of the tests allow of the following deductions :—

In addition to a number of strains of *B. septicus* isolated from cattle, and devoid of all pathogenicity for this species and of all immunizing value against *B. chauvoei*, others have been encountered which morphologically and biologically are indistinguishable from the foregoing, but which are capable of causing lesions exactly like those of black-quarter in cattle. Injuries form the starting-point of these infections. Vaccination against *B. chauvoei* affords no protection. Such cases are due to *B. septicus*. The terms "pseudo-charbon symptomatique" and "charbon para-symptomatique" should be avoided.

Occasionally cases are encountered in which wound infection cannot be held to be the starting-point, the cases occurring just as cases of black-leg occur. From these organisms which appear to stand between *B. septicus* and *B. chauvoei* have been isolated. Many of these intermediate strains give cross immunity reactions. This is a point in favour of the employment of polyvalent vaccines.

BESREDKA (A.). **Pansements spécifiques. Etude sur l'immunité locale.** [Specific Dressings. Local Immunity.]—*Ann. Inst. Pasteur.* 1924. July. Vol. 38. No. 7. pp. 565–580.

The author's conclusions may be summarized as follows :—

Dead cultures of staphylococci injected subcutaneously confer a certain degree of immunity against skin lesions. If injected intradermally the effect is more marked. Filtered cultures act in the same way as entire cultures and their action is more marked. If filtrate be spread over a large area it confers immunity against a lethal dose of virus introduced subcutaneously. The action is rapid Dead cultures of streptococci introduced under the skin do not confer any immunity upon laboratory animals. If injected intradermally

they produce an immunity the strength of which is in proportion to the number of places at which the injections are made. Filtered cultures act in the same way; applied to or injected into the skin they protect against streptococci injected under the skin. Compresses soaked in filtrate applied to the skin of rabbits and guinea-pigs confer immunity against local infection and against fatal infection by subcutaneous inoculation.

EVANS (Alice C.). **The Nomenclature of the Melitensis-Abortus Group of Bacterial Organisms.**—*Public Health Reports.* 1923. Aug. 24. Vol. 38. No. 34. pp. 1943–1948.

DISEASES DUE TO FILTERABLE VIRUSES.

DE KOCK (G. v. d. W.). **A Contribution to the Study of the Virus, Haematology, and Pathology of Infectious Anaemia of Equines under South African Conditions.**—*Union of South Africa, Dept. of Agric. 9th & 10th Rep. Director Vet. Research. April 1923.* pp. 253–313. With 4 plates and 15 charts. (1924. Pretoria: Govt. Printing & Stationery Office.)

Infectious anaemia does not appear to occur as an enzootic in South Africa, and since only isolated cases occur it is sometimes not recognized and is confused with piroplasmosis. As a result of this its geographical distribution is not definitely known. It does not appear to be associated with any particular environment, nor has it a seasonal occurrence.

Diagnosis is a matter of some difficulty for the reason that very inconsistent results have been obtained in experiments designed to test the transmissibility of the disease.

Recovery appears to confer immunity, but the blood of recovered animals retains its virulence for long periods. In one case, the blood of an animal was found to have retained its full virulence seven years after the attack.

The reduction in the number of red corpuscles is a gradual one, and the number per cubic millimetre may fall below two million. In recovered animals which are carriers the blood appears to be free from pathological changes.

The lesions are usually somewhat inconspicuous. The organs principally affected are the liver, kidneys, and heart. Information is lacking regarding the condition of the spleen. In the liver congestion, fatty degeneration and pigmentation are the principal abnormalities encountered. In the uriniferous tubules fatty degeneration has been encountered along with pyknosis of the nuclei. In acute cases degeneration of the myocardium was regularly found.

NAGAO (M.). **Beiträge zur Kenntniss von der pathologischen Veränderungen der roten Blutkörperchen bei der infektiösen Blutarmut der Pferde.** [The Pathological Changes in the Red Blood Corpuscles in Equine Infectious Anaemia.]—*Jl. Jap. Soc. Vet. Sci.* 1924. June. Vol. 3. No. 2. pp. 99–111.

As a rule the blood corpuscles begin to fall in number during the first four days of illness. But the reduction stands in direct relationship

to the degree of fever and the duration of the febrile attack. But it does not necessarily continue throughout the period of fever. The blood count after the primary drop may remain at a constant level although the fever persists. Then, as the temperature returns to normal, there may be a slight rise in the count. In animals that have recovered clinically there appear to be no distinct abnormalities in the blood counts.

During the disease the red corpuscles show changes in resistance. Their resistance increases during the early phases of the disease, and is closely connected with the reduction in number of the corpuscles.

Nucleated red corpuscles always make their appearance, usually during the second week. Their appearance coincides with the maximum degree of resistance of the red cells.

Red corpuscles containing Jolly bodies make their appearance along with the nucleated red cells.

Cells showing punctate basophilia have rarely been encountered. Corpuscles showing polychromatophilia appear at the same time as the erythroblasts, but with the exception of one case out of the ten examined the number was very small. Five of the affected horses were examined post-mortem, and in the red marrow of the long bones a marked increase in the number of red and white blood corpuscles was found.

LEGER (Marcel) & TEPPAZ (L.). **Le " Horse-Sickness " au Sénégal et au Soudan Français : Documents historiques, cliniques et épizootiques.** [Horse Sickness in Senegal and in the French Soudan. Historical, Clinical and Epidemiological Details.]—Extrait du *Bulletin du comité d'Etudes historiques et scientifiques de l'Afrique Occidentale Française.* 1922. Apl.-June pp. 1–22. With 2 charts.

The first outbreak of an acute and fatal disease among the horses began on September 16, 1921.

Between this date and the end of December 200 French horses and two mules died. It is not quite clear whether the arab horses were affected as the figure given for their strength is 26, both before and after the epizootic. Later, it is stated in the text, that 11 out of 26 of these died. It appears, therefore, that the original strength must have been 37.

The outbreak at Dakar in 1921 was a particularly severe one, but the disease has been known to occur in Senegal and Upper Senegal for the last 40 years. The earliest description appears to be that by KORPERS, who described outbreaks in 1882 and 1884 in the Soudan. Since those days the disease has been described by a number of observers, and their accounts of the symptoms leave no room for doubt that, although given a variety of names, the condition was actually horse sickness.

Peracute and acute forms are recognizable. In the former death takes place suddenly with little or no warning. The acute form terminates fatally within 48 hours, as a rule, but exceptionally the animal survives 4 or 5 days.

The existence of a febrile period before the onset of symptoms has been established by the systematic taking of temperatures. In some cases temperatures up to 40°C. have been registered for two or three days before the onset of clinical symptoms. The latter are those observed in cases of the disease in South Africa and elsewhere.

Occasionally relapses occur in horses which appear to be on the way to recovery. These manifest the same sudden onset as in the primary attacks.

The presence of a lemon yellow exudate in the pericardium is almost invariably found at the post-mortem. This varies in amount up to a maximum of about a litre. The bronchi contain blood-tinged froth. The lungs are hepatized. The gastric mucous membrane shows petechiae, particularly around the pylorus. The liver is of an olive yellow colour, and shows small subcapsular haemorrhages. The kidneys are congested, and on section show a small amount of viscous urine which has a strong ammoniacal odour.

In the matter of preventive treatment the authors tried serum from animals which appeared to be on the way to recovery but which actually died as a result of relapses. The serum did not appear to exercise any protective action.

No experiments were carried out with a view to the establishment of the cause of the disease.

A number of flies caught on both healthy and infected horses were dissected, and in the stomachs of these crithidia were found. No connection between these and the disease was traced. The flies were examined by ROUBAUD, who declared them *Lyperosia thirouxi* and *Lyperosia minuta*.

DONATIEN (A.) & LESTOQUARD (F.). **L'anémie pernicieuse du mouton et de la chèvre.** [Pernicious Anaemia of the Sheep and the Goat.] —*C. R. Acad. Sci.* 1924. June 23. Vol. 178. No. 26. pp. 2203–2204.

The disease described has been observed by the authors among sheep and goats intended for experimental investigations in Algeria. It is characterized by irregularity of temperature, anaemia, rapid loss of condition, and the general lesions of cachexia. The disease almost invariably terminates fatally.

No causal organism has been demonstrated either with the microscope or by culture. The disease is readily transmissible to sheep and goats by blood, serum, or urine inoculation. The virus is a filter passer. A minute dose is sufficient to produce infection. Recovery appears to produce no immunity since an animal which has reacted to an initial inoculation will react again to a second.

The disease produced experimentally agrees in all its characters with the natural infection. The course of the disease ranges from ten days to several months.

In addition to the general condition of cachexia there may be found in cases which terminate suddenly the lesions of a septicaemia. Non-specific broncho-pneumonia is sometimes found.

Lesions are always present in the suprarenal bodies, and take the form of haemorrhages, leucocyte infiltrations, and changes in the parenchyma cells.

Two attempts to transmit the disease to the ass by intravenous and subcutaneous inoculations have succeeded, and it has also been found possible to carry on the disease in cases in series and to transmit it back from the ass to the sheep. Similar successful inoculation experiments have been carried out with calves.

METTAM (R. W. M.). **Snotsiekte in Cattle.**—*Union of S. Africa. Dept. Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923,* pp. 395–432. With 1 plate. (1924. Pretoria: Govt. Printing & Stationery Office).

Snotziekte is an acute specific disease of cattle caused by an ultramicroscopic but non-filtrable organism. It is characterized by general hyperplasia of lymphoid tissue throughout the body. In some cases there is necrosis and subsequent erosion of mucous membranes.

The condition does not appear to be a common one, but it appears sporadically causing heavy losses. It would seem that formerly it was far more common than at present. Animals of all ages are susceptible, but the condition appears to be specific for bovines. It has been observed to be transmitted from wildebeest to cattle, and it has been passed from sick to healthy cattle by intravenous and subcutaneous inoculation with blood. A single observation indicates that the wildebeest may act as a carrier. But in a few cases in which recovered cattle have been available for experimentation the indications have been that recovery, when it takes place, is complete. It has been found that the disease may make its appearance when cattle and wildebeest are herded together, and in one case the blood of wildebeest was infective, but in no instance have symptoms of infection been seen in the wildebeest.

Under natural conditions the period of incubation is about a month. In the experimentally produced disease it has varied from two to four weeks. The disease is characterized by high temperature, profuse discharge from the eyes and nose, and congestion of the mucous membranes, which later show areas of necrosis and erosions. Opacity of the cornea is of frequent occurrence. The lymphatic glands are all enlarged and indurated but not painful.

Prior to death, which occurs in from 4 to 10 days, the temperature falls to about 103°. Death is preceded by coma. Constipation is pronounced. The congestion and erosion are not limited to the visible mucous membrances. Lesions of this type in the upper air passages and in the abomasum.

Histological examination reveals the presence of hyperplasia of the lymphoid tissues, and infiltrations of lymphocytes in the parenchyma of the organs, especially in situations closely related to blood vessels.

The virus, as has already been mentioned, while ultravisible, is non-filtrable. The evidence obtained indicates that it is related to the red blood corpuscles. Two hours' exposure at 70°C. is sufficient to destroy it. It may be preserved in an ice chest for fourteen days, but after this period it rapidly dies out.

Recovery is apparently of rare occurrence, and when it occurs after a mild attack it leaves no immunity. In experimental cases (70 in number) the mortality was 97 per cent.

REMLINGER (P.). **Contribution à l'étude de l'action de la glycérine sur le virus rabique.** [The Action of Glycerin on the Virus of Rabies.]—*C. R. Soc. Biol.* 1924. Jan. 25. Vol. 90. No. 2. pp. 70–72.

The author gives a brief account of experiments in which the action of glycerin was tested upon the brains of rabbits dead of rabies, due

both to fixed and street virus and in the fresh and partly dried condition. From these he concludes that when a rabic brain is immersed in glycerin the persistence of the virus in the centre of the nerve tissue depends upon the bulk of the piece immersed.

He found that virus dies more rapidly in spinal cord than in brain although the fragments immersed were the same size.

Fragments subjected to desiccation in Pasteur flasks for 2 or 3 days prior to being placed in the glycerin lost their virulence more rapidly than pieces immersed when perfectly fresh.

REMLINGER (P.). **L'huile d'olives peut-elle remplacer la glycérine pour la conservation du virus rabique ?** [Can Olive Oil be used in the Place of Glycerin for the Preservation of the Virus of Rabies ?]—*C. R. Soc. Biol.* 1924. June 20. Vol. 91. No. 21. pp. 59–61.

On the score of economy an attempt was made by the author some twenty years ago to replace glycerin by olive oil for the preservation of the virus of rabies. Olive oil was selected merely because of some similarity of consistence. It was found to be a failure, as it was devoid of antiseptic properties.

Recently a note was published by GONSALVES to the effect that the two halves of a rabic brain were preserved respectively in glycerin and olive oil and that these produced rabies in rabbits after 56 and 95 days, death taking place in from 6–9 days.

Remlinger has repeated the experiments originally carried out in Turkey, with the same results as before.

REMLINGER (P.) & BEL (P.). **Inefficacité de l'urotropine comme médicament préventif ou curatif de la rage.** [The Uselessness of Urotropine for the Preventive or Curative Treatment of Rabies.]—*C. R. Soc. Biol.* 1924. May 23. Vol. 90. No. 17. p. 1312.

Two groups of 7 guinea-pigs were inoculated intramuscularly in the back of the neck with a particularly virulent strain of street virus. These were treated with repeated injections 2·5 cc. of 20 per cent. urotropine subcutaneously, and intracranially 0·5 to 1 cc. of the same solution respectively. The former were injected daily, and the latter, which were treated by both methods, every other day. A third similar batch was kept for controls.

All the animals injected both subcutaneously and intracranially died. One only of these injected subcutaneously survived. Two out of the seven controls survived. The injections of urotropine were continued until just before death occurred.

BÉDIER (E.) & CHASSIGNEUX (A.). **Au sujet de quelques accidents observés à Dakar au cours des passages de virus rabique.** [Accidents encountered at Dakar during Passages of the Rabic Virus.]—*Bull. Soc. Path. Exot.* 1924. June 11. Vol. 17. No. 6. pp. 511–514. With 1 text fig.

In view of REMLINGER'S experiences in Tangier regarding the occurrences of unexpected sequelae following the inoculation of rabbits with the virus of rabies, the authors detail similar accidents which have come under their notice during the last two years.

The virus used at Dakar for the treatment of rabies was obtained from Tangier in 1921, and at the time of writing was in its 39th passage.

During the last two years 63 rabbits have been inoculated intracranially. Of these 44 died of rabies between the 7th and the 25th days, 13 died accidentally within 48 hours and 6 failed to become infected. Of 21 rabbits inoculated into the anterior chamber of the eye 16 died of rabies in 12 to 16 days, four failed to become infected, and the remaining died on the 93rd day, having developed torticollis and chorea. The failures to infect were not due to loss of virulence of the virus, as was proved by the fact that positive and negative results were obtained with the same emulsion.

Attention is drawn to the variation of the period of incubation, and the point is insisted upon that all the untoward results were obtained during the hot, wet seasons, that is to say during August and September, 1922, and September and October, 1923. The virus became normal in behaviour with the return of cool weather.

Since in isolated places it is impracticable to obtain fresh virus when such accidents occur, the indications are that during what may be called the danger period the number of animals inoculated should be increased.

STIRLING (R. F.) & PILLAI (R. V.). **Atypical Rabies.**— *Vet. Jl.* 1924. Aug. Vol. 80. No. 8. pp. 318–320.

The case described occurred in a dog and apparently followed a clean cut wound in the buttock. The wound was believed to have been caused in some way by the dog chasing a cat through a bamboo clump. It healed in 5 or 6 days without any suppuration. About a month later the dog suddenly became ill and showed signs of distress. Its temperature was found to be 107·2°. Piroplasms were found to be fairly numerous in its blood. During the next few days he became dull and listless, and sought dark corners. He ate and drank sparingly. He showed no dropping of the jaw or weakness of the loins. Later a blood tinged nasal discharge and dysentery developed. On the 11th day of illness death occurred.

At the post-mortem examination the following lesions were noted :— Streaks of congestion in the pharynx, larynx and trachea. Small areas of consolidation in the lungs. Areas of congestion in the stomach. There was a small adhesion between two parts of the intestine causing partial obstruction. The liver was congested. The brain was apparently normal. Sections of the hippocampus were examined and Negri bodies were found in abundance.

LEVADITI (C.), NICOLAU (S.) & SCHOEN (R.). **La nature du virus rabique fixe.** [The Nature of the Fixed Virus of Rabies.]— *C. R. Acad. Sci.* 1924. June 20. Vol. 91. No. 21. pp. 56–58.

The Negri bodies are held to be the pansporoblast stage of the virus of rabies, and the authors have attempted to discover whether the fixed virus could be placed in conditions which would permit it to recover its power of pansporoblast formation, that is to say, its capacity for producing Negri bodies.

Fixed virus was used for the intracranial inoculation of a rabbit, and when this animal died on the 9th day its brain was used for the cerebral inoculation of a monkey. This also died on the 9th day. The virus from this monkey was passed on to another by intracranial inoculation. In rabbits inoculated intracranially with the brain substance of this monkey death took place in from 8–12 days. No Negri bodies were discovered.

It is not quite clear exactly what was done in the next passage as the brain used is said to be that of cynomolgus 15, whereas the *Macacus cynomolgus* previously referred to was No. 45. This is possibly a misprint, and it appears to be probable that the animals 15 and 45 were one and the same. The brain was used for the intracranial inoculation of a chimpanzee. Death took place on the 12th day, when the virus was passed on again to rabbits. Severe lesions of the nervous system were produced, but no Negri bodies could be found. No definite opinion is expressed whether the loss of power to form pansporoblasts is permanent, but the suggestion is made that inoculation with fixed virus from the rabbit should be carried on in a series of dogs. The loss of the power is considered to be a mutation.

SZYMANOWSKI (Z.) & SIENCZEWSKI (St.). **Contribution à l'étude de l'immunisation des chiens contre la rage.** [The Immunization of Dogs against Rabies.]—*C. R. Soc. Biol.* 1924. Mar. 21. Vol. 90. No. 10. pp. 697–699.

Thirteen dogs have been treated by SEMPLE's method, each having been given 20 subcutaneous injections of 5 cc. in the course of 3 weeks. After a lapse of 10 days the vaccinated dogs and 9 new dogs were given intramuscular injections of 5 cc. of brain emulsion of a dog dead of street rabies. In the course of 6 weeks one dog of each batch died. Six weeks later 5 vaccinated and 4 control dogs were again injected intramuscularly with street virus. Only two dogs, both vaccinated, died. Ten weeks later two dogs which had been vaccinated and infected once were again inoculated; on this occasion one was inoculated intracranially. This animal died on the 6th day.

Three controls which had previously been infected once were again inoculated and resisted infection.

The brains of the dogs which died were tested by inoculation of rabbits. Furious rabies developed.

MISCELLANEOUS.

THEILER (Arnold), DU TOIT (P. J.) & MITCHELL (D. T.). **Gousiekte in Sheep.**—*Union of South Africa. Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 9–105. With 4 plates and 1 text fig. (1924. Pretoria: Govt. Printing and Stationery Office.)

Gousiekte, meaning sudden sickness, is a disease of sheep due to the ingestion of *Vangueria pygmaea* (Rubiaceae). The plant contains a toxic principle which causes myocarditis with subsequent dilatation of the ventricles, thus leading to heart failure.

In about 30 per cent. of cases death occurs within 24 hours of the onset of symptoms. In about 50 per cent. affected animals may survive for periods ranging up to a week. In the remainder they may live for more than a week. Recovery is highly exceptional. Lagging behind the flock is first observed. Then animals will be found lying with the head and neck extended. Accelerated respiration is a most marked symptom, and this may be accompanied both on inspiration

and expiration by a moaning or grunting sound. In the less acute cases, in which the sheep are still standing, causing them to move or hurry brings on marked symptoms very rapidly.

The disease is non-febrile. The nature of the toxic principle has not as yet been determined.

LEGG (J.). **The Gilbert River Horse Disease.**—*Queensland Agric. Jl.* 1924. June. Vol. 21. No. 6. pp. 416–419.

This disease, as its name implies, occurs in certain areas along the Gilbert River in Queensland, and it does not appear to have been encountered with certainty anywhere else. The disease appears to be most serious at places where horses are confined in paddocks along the river flats. It occurs only in the wet season, and its onset coincides with the onset of the rains. There are some indications that the severity of the disease varies with the heaviness of the rains, but it cannot be said with certainty that this is so.

The description of the symptoms given by the author is based upon his own observation of a few cases, and upon accounts given by others.

In the early stages dullness and sleepiness are observed, the affected animals tending to separate themselves from their fellows. While in this condition periods of brightness are noticed during which the animals appear to rouse themselves. They soon, however, relapse into dullness again. Yawning is frequent. The period of depression is followed by a phase of violence which lasts on an average twenty-four hours. The degree of violence is generally inversely proportional to the length of the attack. Once this phase is established the animal tends to move forwards either in a straight line or in circles, taking no notice of obstacles in its path. At the post-mortem examination the liver usually has a greenish-yellow or greyish-green colour, and may have a mottled appearance, which is due to minute haemorrhages into the liver tissue. On microscopic examination the author found evidence of cirrhosis.

The stomach is enormously distended with food, and in one case seen death was actually due to rupture of that organ. The mortality is very high. It appears to be highly exceptional for recovery to take place when symptoms of violence have made their appearance.

Definite experiments regarding the causation of the disease have not been carried out, but in the author's opinion the close resemblance which the condition bears to diseases encountered in New Zealand and in South Africa suggests a similarity of cause, viz., plant poisoning of some kind, probably Senecio.

DU TOIT (P. J.). **Sweating Sickness in Calves (Preliminary Report).**—*Union of S. Africa. Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 233–250. With 2 figs. & 13 charts. (1924. Pretoria: Govt. Printing & Stationery Office.)

The information contained in this preliminary note was gathered in 1922 in the course of a visit to an infected farm.

The cause of the condition has not yet been detected.

As is indicated by the name, the disease attacks calves, and the most prominent symptom is sweating. Its existence appears to have been recognized in various parts of Rhodesia and South Africa for some ten years. At the post-mortem examination naked-eye lesions are inconspicuous in the internal organs. Microscopic examination

reveals the presence of a marked haemorrhagic glomerulo-nephritis. The disease occurs during the hottest months of the summer and may have a mortality as high as 75 to 80 per cent.

Up to the present all attempts to transmit the disease experimentally by inoculation, contact, etc., have failed. There is, nevertheless, some evidence to suggest that the disease is actually infectious.

While the disease is certainly one of the hot weather, there appears to be no co-relation between mortality and rainfall. Altitude appears to be without influence upon its occurrence.

In the absence of knowledge regarding the actual course of the disease it is useless to speculate regarding the mode of transmission, but the author believes that some form of carrier is responsible.

The onset of the disease is, as a rule, sudden, and is marked by a sudden rise of temperature, which, however, soon drops again to normal. The skin over the body feels hot, but the extremities are cold. Sweating sets in at an early stage, and the areas chiefly affected are the cheeks, the base of the ears, sides of the neck, behind the elbows, flanks and inguinal regions. Actual sweating can, as a rule, be seen in the early morning only. Later in the day no moisture can be detected, but the skin is hot and clammy and the hair has a matted appearance. Lachrymation, followed by conjunctivitis and salivation, are frequently noted. Erosions of the buccal mucous membrane follow. There appears to be no disturbance of the digestive system.

Death may take place in 2 to 4 days, or the symptoms may abate within a week and complete recovery take place within the following fortnight.

GREEN (H. H.) & ANDREWS (W. H.). **The Toxicity of** *Adenia digitata* **Burtt-Davy** (*Modecca digitata* **Harv.**).—*Union of S. Africa. Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 381–392. (1924. Pretoria: Govt. Printing and Stationery Office.)

The root of this plant bears a close resemblance to a large turnip and also edible roots such as Coccinea. It is to this fact that cases of poisoning among human beings have been attributed.

Chemical and physiological examination showed that the fresh root contained a cyanogenetic glucoside, equivalent in amount to 0·04 per cent. hydrocyanic acid. There was also present an enzyme causing rapid hydrolysis so that air-dried root in moderate quantities does not produce cyanic intoxication. There was also isolated a toxalbumin which was resistant to desiccation, and which could be readily extracted from the dried root with water or salt solution. This was exceedingly poisonous for man, sheep, dog, rabbit, guinea-pig, and rat, and probably other animals. This was precipitable by ammonium sulphate or alcohol above 50 per cent., and coagulated at 60° to 70° C.

For rabbits and guinea-pigs the fatal dose of the fresh root is a few grammes, and for the sheep about half a pound.

Experiments indicated that by inoculation the lethal dose was very small, even though the pure phytotoxin was not injected.

Large doses administered by the mouth produce acute haemorrhagic gastro-enteritis. After subcutaneous injection the lesions found are cessation of the heart in diastole, congestion of the kidneys, incipient degeneration of the liver, slight gastro-enteritis and oedema at the seat of inoculation.

With very small doses these lesions are not recognizable.

Moussu (Raymond), Giraudeau, & Maubaret. **Recherches sur la nature et le traitement de la jaunisse des muletons nouveau-nés.** [The Nature and Treatment of Jaundice in New-born Mules.]— *C. R. Soc. Biol.* 1924. June 20. Vol. 91. No. 21. pp. 68–69.

This disease is characterized by jaundice and usually by the passage of red or brown urine. It proves fatal in at least 50 per cent. of cases.

The authors' observations lead them to look upon the disease as one of maternal origin. A mare which has given birth to a mule foal which becomes affected with jaundice will probably do the same thing again, but a horse foal from such a mare will not be affected.

Microscopic examination of the blood reveals the typical picture of a severe anaemia. They have detected nothing to account for this. They believe that hybridization upsets the equilibrium of the blood and that the corpuscles are extraordinarily fragile.

Acting upon this idea, treatment is directed towards re-establishing equilibrium in the blood and increasing its coagulability, which is always low.

Three types of treatment have been tried :

(*a*) Injections of 20–30 cc. of horse serum (third bleeding) intravenously. The results have not been good. The mortality has been about 30 per cent.

(*b*) Intravenous injections of 20 to 30 cc. of horse serum with 100 to 150 cc. of citrated mule blood. Results negative. No change in percentage mortality.

(*c*) Intravenous injections of mule serum. The intravenous injections of mule serum into ailing mule foals has yielded surprising results. Ninety per cent. of cases have recovered. The dose used was 50 cc. and it was warmed to body temperature. The effect is observed within an hour or two, and recovery, except for persistent discolouration of the membranes, is complete within 2 to 3 days.

The success of this treatment has led the authors to give injections with a view to preventing the onset of the disease. A minimum of 50 cc. is necessary, and mule foals, the progeny of mares whose previous foals were affected, have remained healthy.

Neser (C. P.). **The Blood of Equines.**— *Union of S. Africa, Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 481–556. With 4 plates in colour and 13 graphs. (1924. Pretoria : Govt. Printing and Stationery Office.)

The author points out that while a considerable amount of work has recently been done in connexion with the blood of the human subject, little or none has been devoted to the blood of animals.

The present work is a preliminary study of the blood of equines.

The paper is divided into 8 sections, dealing with (1) Technique, (2) Preliminary observations on the erythrocytes of equines and the accuracy of the figures obtained, (3) Main observations on the erythrocytes of the horse and those of the donkey and mule compared with these, (4) The blood of equines in stained smears, including the classification of the leucocytes, (5) Number and differential counts of leucocytes of the horse, (6) Leucocytes of the donkey, mules, mares in and with foals, and foals compared with those of the horse, (7) Summary, and (8) Discussion.

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The author finds that in obtaining an estimate of the number of red corpuscles present in a sample of blood more constant, and therefore, presumably, more accurate results are obtained by centrifuging than by actual counting. He has constructed the formula

$$\frac{\text{percentage volume of red cells}}{4{\cdot}35} = \text{number of erythrocytes per c.mm.}$$

expressed in millions.

Regular exercise has a very marked effect upon the corpuscular content of blood. Racehorses in full training show a blood count three times as large as stabled animals. The influence of sex, age, breed, etc., was very slight as compared with regular exercise. Nor were moderate starvation or thirst, food, water, or moderate exercise found to influence the blood counts to anything like the same extent as regular exercise. Exercise also causes an even distribution of the white corpuscles. It was observed that a draught of water following a period of thirst resulted in an increase of eosinophiles in the jugular blood. Foals shortly after birth, and mares before and after foaling, showed a remarkably high percentage of neutrophiles. The counts became normal within two months.

In the blood of donkeys the counts for lymphocytes and neutrophiles are reversed as compared with those of the horse, and the eosinophile count is higher.

YOKOTA (Kiyoshi). **Méthode de coloration des cils.** [Method of staining Cilia.]—*C. R. Soc. Biol.* 1924. May 23. Vol. 90. No. 17. pp. 1303–1304.

The author insists upon the necessity of using bacteria in the water of condensation of agar cultures for getting satisfactory results.

For aerobes, the cultures should be grown upon faintly alkaline agar for 18 to 24 hours at 33–35° C. The water of condensation is centrifuged for about 30 minutes. The sediment is mixed with salt solution containing 0·5 per cent formalin. This formalin fixes the cilia. The author finds that heating films to 65° C. for 10 minutes causes the cilia to become detached.

To a 5 per cent. solution of tannic acid is added drop by drop saturated solution of tartar emetic until the liquid becomes milky. This solution keeps for a month. This is the mordant.

The stain is made up by adding to 30 cc. of anilin water 1 cc. of a concentrated solution of fuchsin (? alcoholic.—ED.).

A thin smear is made on a slide and allowed to become dry. It is then fixed by heat. The film is covered with the mordant and heated over the Bunsen until the liquid just boils. The preparation is well washed in running water and covered with the stain. Heat is again applied until the stain just boils. The specimen is again washed, then dried and is ready for examination.

BERDNIKOW (A.). **Limite du développement des microbes dans les milieux artificiels.** [The Limits of Multiplication of Microbes in Artificial Media.]—*C. R. Soc. Biol.* 1924. May 23. Vol. 90. No. 17. pp. 1305–1306. With 1 text fig.

This article describes a method of testing the repeated cultivation of yeasts in media previously used for growing them in. It was found

that a medium used for a primary culture would give rise to some growth when it was reinoculated, but this did not take place with second and third subcultures.

OGUNI (H.). **Comparative Studies on the Methods of preparing Serum.** —*Jl. Jap. Soc. Vet. Sci.* 1924. June. Vol. 3. No. 2. pp. 97–98 [Author's abstract].

The author has carried out experiments with various types of apparatus for the purpose of ascertaining by which method the maximum yield of blood serum is obtained. He specifies that the apparatus tested have been

(1) That used at the Pasteur Institute, Paris.

(2) The bucket for blood clotting designed by the Laboratory of the Indian Civil Veterinary Department. [Presumably that designed in 1920 for the Imperial Bacteriological Laboratory, Muktesar.]

(3) Latapie's apparatus.

He finds that the yield of serum depends upon the "individuality" of animals, and the total amount of serum obtained from clot at intervals of two days over a period of nine days is 41–64 per cent. The percentage of serum from a first bleeding of 4,000 cc. was lower by 6·5 per cent. than from a similar second bleeding taken two days later.

Slight starvation was not found to affect the serum yield.

The "adequate" temperature for the preparation of serum is 20° C.

In clotting methods the yield of serum is proportional to the height of the cylinder used.

The compressive method employed at Buitenzorg, Java, is the most suitable for horse and pig blood. This gives a yield higher by 4–13 per cent. than the usual clotting method, and the serum is free from haemoglobin. The Indian type of bucket is best for cattle blood, though contamination sometimes occurs, and there may be a slight admixture of blood corpuscles.

FAURE (Ch. L.). **Sur une technique de coloration rapide par l'hématoxyline au fer.** [A Rapid Method of Staining with Iron Haematoxylin.]—*C. R. Soc. Biol.* 1924. Jan. 25. Vol. 90. No. 2. pp. 87–88.

The method gives the best results after fixation by Bouin or alcoholic Bouin. Two solutions are required. The first is a modification of TRIBONDEAU'S silver haematoxylin and the second is a modified form of the solution devised by MOREL and BASSAL.

These solutions are made up as follows:

Solution A. Two grammes of crystalline haematoxylin are dissolved in 60 cc. of 90 per cent. alcohol. This solution is poured on to oxide of silver precipitated from the nitrate by caustic potash (as in the preparation of Borrel's blue). The mixture is heated over a water bath (to what extent is not stated) and then filtered.

Solution B. Two parts of official perchloride of iron solution, 2 parts of pure hydrochloric acid, 2 parts of a 4 per cent. solution of copper acetate and 94 parts of distilled water.

Equal parts of each are mixed just before use. The stain is allowed to act for 4 or 5 seconds. Wash under the tap. Place for 2 seconds in 1 per cent. hydrochloric acid. Wash. Place in a saturated solution

of carbonate of lithium for 2–3 seconds. Wash. Counterstain, and mount. The results resemble those obtained by Heidenhain's method, but they are not so perfect.

VAN ZYL (J. P.). **Note on the Composition of Various Samples of Arsenite of Soda.**— *Union of S. Africa. Dept. of Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 777–780. (1924. Pretoria: Govt. Printing & Stationery Office.)

——. **On the Determination of Arsenic, chiefly in Dipwashes.**— *Idem.* pp. 783–795.

——. **Oxidation in Arsenical Dipping Tanks.**— *Idem.* pp. 799–808. With 11 charts.

BOOK REVIEW.

VELU (Henri) [Chef du Laboratoire de Recherches du Service de l'Élevage du Maroc.] & BAROTTE (Jean) [Laboratoire de Recherches des T.O.M. à Casablanca.]. **Éléments pratiques de pathologie vétérinaire exotique. Applications du laboratoire en médecine vétérinaire.**—pp. iii+435. With 21 text figs. 1924. Paris: Émile Larose, Libraire-Éditeur, 11, rue Victor-Cousin.

This book is divided into two main parts: the first deals with generalities, and the second with specific conditions.

The first portion amounts to 135 pages, and deals with laboratory methods, including a description of the laboratory equipment necessary for the practitioner in tropical countries.

The second portion comprises eight chapters, dealing with blood parasites, filterable viruses, bacterial diseases, endo- and ecto-parasites, vegetable poisons, diseases of obscure origin and vaccines and sera.

The book does not profess to be a complete scientific treatise on the subject dealt with, but aims rather at emphasizing the close relationship between laboratory and field investigations, and at equipping veterinary officers with the requisite knowledge of laboratory technique, and thus rendering their field work the more effective.

In view of the aim of the book references are reduced to a minimum.

It is obvious that it is impossible to deal in very full detail with the subjects covered by the second part of the book in the space of some three hundred pages. The information may be said to be given very largely in tabular and tabloid form, but this method serves the purpose of the book admirably.

A. Leslie Sheather.

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